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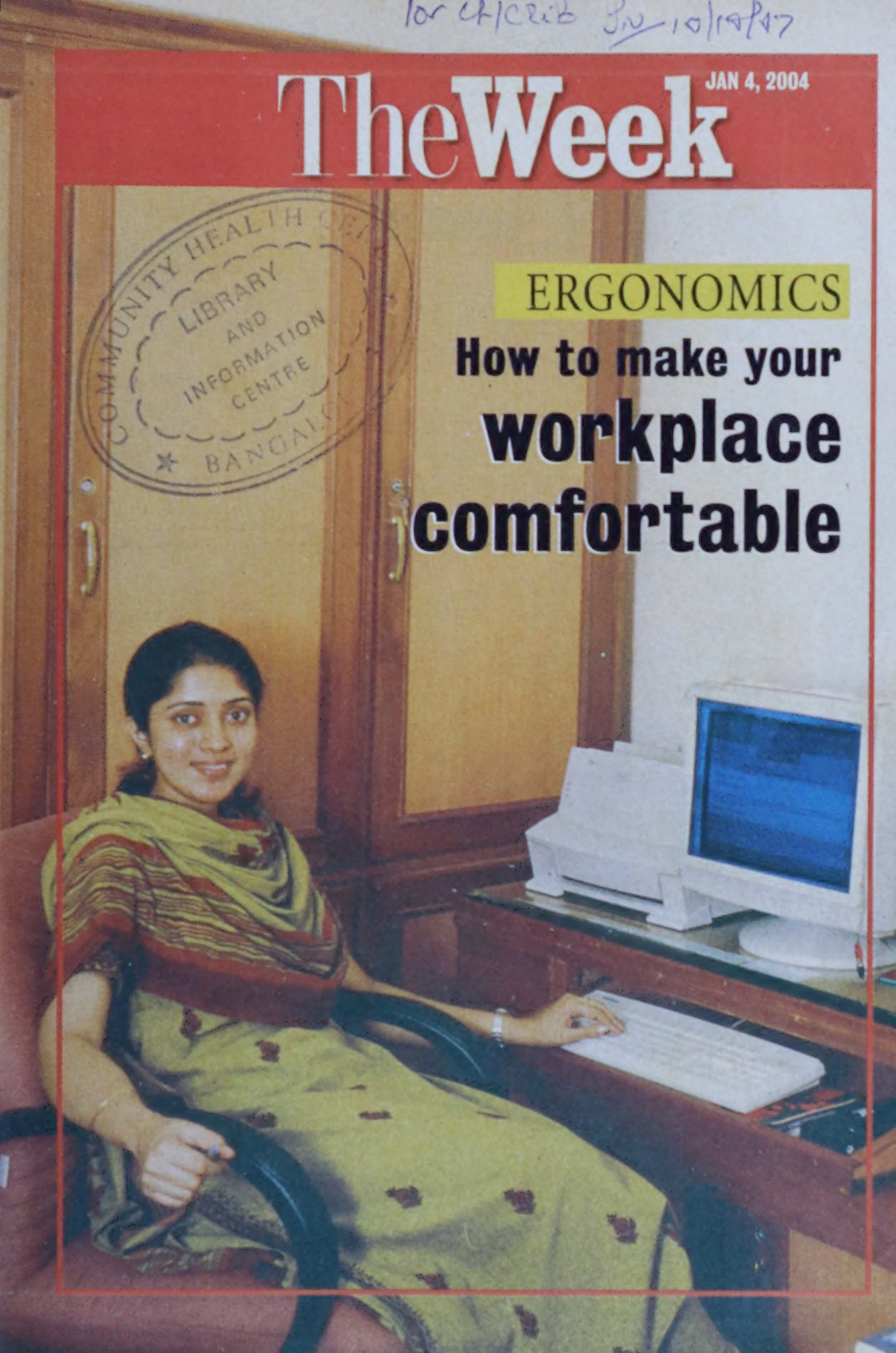
ERGONOMICS

How to make your workplace comfortable



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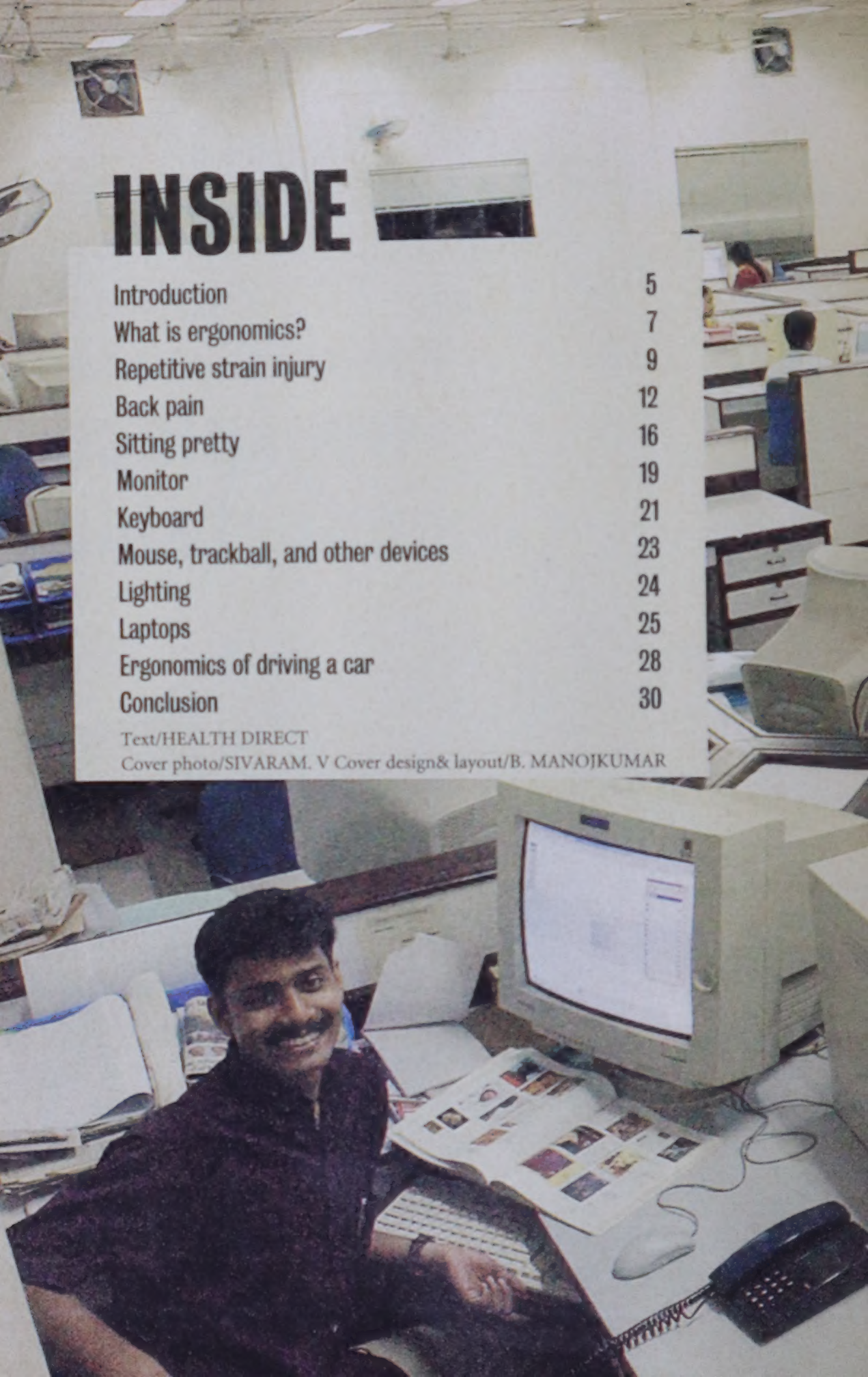

P. PEETHAMBARAN

"We pray with our hands and often communicate with them. We use them to eat, work and make love. We employ them as marvellously sophisticated instruments of flexibility and strength and when they are damaged we anguish.

Keith L. Moore,
Clinically Oriented Anatomy"

Introduction

Many among us would have heard the story about the ant and the elephant—how the little ant felled the mighty elephant. Most of us would have read it like a folk lore, something to read and forget. A few would have paid attention and given it some thought. A fewer still would have taken the trouble to read between lines.

The story is being re-enacted today at the workplace. The story now is about how the smart, suave, well-travelled and well-heeled corporate professional is being brought to the heels. Not by man or diseases but by such mundane things as

Poor ergonomics at the workplace can cause backache, numb hands and watery eyes.

AFP

the chair, table, computer and keyboard. These are objects, accessories if you like, that were created to help us live better and work better.

This supplement is inspired by Savita, a software professional working with a leading multinational company. A smart worker, she climbed the corporate ladder very fast, earning her brownie points on the way. One day during a presentation, she realised that her hands would not move. Alarmed, she went to the doctor where a detailed examination revealed that she was suffering from computer related injuries. Today, she is recouping and it will be another six months before she can get back to work.

There are countless others like Savita who battle with backaches, numb hands, sore necks and watery eyes every day. Symptoms so mundane that most of us would brush them aside without a second thought; symptoms that at first glance do not point to the real culprit; symptoms that lead us to a wrong line of treatment.

The culprit is poor ergonomics and the health issues it creates are broadly termed as repetitive strain injury. A new-age health issue, it is affecting millions worldwide.

This supplement aims to make a difference by explaining the basics of ergonomics, how it helps to keep us healthy and the relevant health issues owing to poor ergonomics. ❖

What is ergonomics?

The word 'ergonomics' is Greek in origin and means natural laws (nomoi) and work (ergon). One of the guiding principles of the science is creating a balance between the demands of a task and the capabilities of the individual performing it.

To define it more formally:

'Ergonomics is the science of fitting the workplace conditions and job demands to the capabilities of the working professionals. The goal of ergonomics is to make the workplace more comfortable and to improve both health and produc-

The goal of ergonomics is to make the workplace comfortable and to improve health and productivity.

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tivity. To meet these goals, the capabilities and limitations of workers and their tools, equipment and furniture are considered in conjunction with how they relate to particular tasks.'

The principles of ergonomics touch almost all aspects of our life. In fact, it can be applied at work (offices and factories), home (cleaning and cooking), and even during recreation (gardening and sport).

Poor ergonomics results in many disorders. The medical professionals call them musculoskeletal disorders, cumulative trauma disorder or repetitive strain injury. Whatever the terms might be, the fact remains that unless a conscious effort is made by the employees and their employers to address the issues related to poor ergonomics, it will continue to result in increased employee medical costs and loss of productivity.

Since the extent of scope of this topic is vast, this supplement would restrict its coverage, predominantly, to ergonomic applications in offices.

Before we get into the broad applications of ergonomics in your office, it is important to know the health issues they create.

Do you realise that many symptoms you have can be attributed to improper ergonomics—positioning of your work station, or even the way you sleep? Poor ergonomics often leads to health issues like carpal tunnel syndrome, back and neck pain, strained eyes and general fatigue. Let us understand what these are and their possible causes. ❖

Repetitive strain injury

Repetitive strain injury describes a range of conditions caused by the constant repetition of certain movements. They are injuries to muscles, tendons and nerves caused by overuse or misuse. They most commonly affect the hands, wrists, elbows, arms, shoulders, back, or neck. Unlike strains and sprains, which usually result from a single incident (called acute trauma), repetitive strain injuries develop slowly over time; thus, they are also called cumulative trauma disorders or muscular skeletal disorders.

Advanced symptoms include weakness, especially in the thumb muscle, and clumsiness in your hands. When your hands are affected, even mundane chores like writing, lifting a paper or buttoning your shirt become difficult.

These symptoms may appear randomly and at any stage in the development of an injury. These symptoms take time in developing and may not appear immediately as you are doing the activity that is causing the problem

Repetitive strain injury is caused by overuse or misuse of muscles, tendons and nerves.

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and are not necessarily experienced in the body part where the actual stress is occurring. For instance, a pain in your elbow or shoulder which you may experience in the night while sleeping may be a sign of a repetitive strain injury resulting from keying in or using a mouse.

Mostly the intensity and the frequency of your symptoms are directly related to the extent of your injury.

If you have any of these symptoms, do not ignore them. They may be warning signs of a developing repetitive strain injury. Contact your physician immediately.

Carpal tunnel syndrome

Carpal tunnel syndrome is the most serious and best known repetitive strain injury. It is a condition affecting the hand and the wrist.

Carpal tunnel is a space in the wrist surrounded by wrist bones and by a rigid ligament that links the bones together. Through this small tunnel pass the flexing tendons of the fingers and thumb as well as the median nerve. These tendons attach muscles to bones in the hand and transfer the movement of the fingers from muscles to bones. The median nerve carries signals from the brain to control the actions of the fingers and hand. It also carries information about temperature, pain and touch from the hand to the brain, and controls the sweating of the

Where does it hurt?

Watch out for the following symptoms in the injured area:

Discomfort
Muscle aches
Tenderness
Inflammation or swelling
Weakening of the tendons

More serious cases may lead to the following symptoms in the hands, fingers and arms:

Pain
Numbness
Tingling
Loss of sensation
Loss of joint movement

Graphics/N.V. JOSE

hand.

The thumb, index, middle and ring fingers are under the control of the median nerve. In the carpal tunnel, the tendons of the fingers surround the median nerve. Swelling of the tendons reduces the space in the tunnel and squeezes the median nerve which is softer than the tendons. Pressure on this nerve can injure it.

Such injury results in sensations of numbness, tingling, pain, and clumsiness of the hand. This combination of symptoms is called carpal tunnel syndrome.

Symptoms

The typical symptoms of carpal tunnel syndrome are tingling of the thumb and of the index, middle and ring fingers and pain at night. The pain is so severe that the patient cannot sleep, but is often relieved by shaking, hanging, or massaging the hand. Pain may involve not only the hand, but also the arm and the shoulder. Numbness and loss of manual dexterity occur in more advanced cases. Weakness of the hand also occurs, making it difficult for the patient to pinch and grasp. The victim may drop objects or be unable to use keys or count change with the affected hand. The skin may become dry because of reduced sweating. ❖

Back pain

More and more people who do sedentary work are now complaining of back pain. While there are other causes of back pain, in most cases it is bad posture that causes the pain. These postural problems manifest usually during sitting, standing, sleeping or driving. The two greatest problems seem to be sitting upright or forward, and not changing position.

Tips to avoid back pain at work

- Avoid sitting with a ninety degrees hip position. Sit with your hip joints slightly straightened. This might resemble a slouch. A supported slouch may be healthy in the long run. Even if the hip joints aren't somewhat straightened, sitting in a reclined posture is more healthy than sitting upright.
- Maintain a neutral back posture by sitting against the chair's backrest—this supports the natural 'S' curve of the spine.
- Avoid crossing your legs, dangling your feet or walking on your tip-toes.
- Provide space between the front edge of the seat and the back of the knees.
- Change positions frequently. A healthy body can tolerate staying in one position for only about 20 minutes. That is why sitting in an

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airplane, at your desk or at a movie theatre becomes uncomfortable after a short time; after a while the tissues become less elastic. Then, stress builds up and causes discomfort.

- Changing positions frequently really helps. Moving, sitting, stretching all help in releasing the tension from your muscles.

What can you do?

Stop or reduce the activity that is causing discomfort.

See a doctor. If you are suffering from any of the symptoms listed above, it is advised that you seek professional medical advice at the earliest. Though India has a few qualified doctors who are specialised in evaluating and treating repetitive strain injury, most orthopaedicians and neurologists also can be of help. A word of caution is that most times, you may also get treated symptomatically or for other ailments which cause similar symptoms.

Get a work station evaluation done. A proper workstation evaluation not only helps in the prevention of repetitive strain injury to a large extent but also prevents the condition from aggravating. The importance of workstation design increases with the amount of time spent at the computer. As a general guide anyone who spends more than two hours a day in front of a computer should take special care to ensure the workstation is user-

Avoid overcrowding the workplace. Things you use frequently should be easily accessible.

friendly. Your workstation evaluation includes the ergonomic evaluation of your chair, table, monitor, pointing devices like mouse, key board and lighting. These may not entirely rule out the possibility of repetitive strain injury, but would definitely reduce the possibility of getting this illness.

Workstation evaluation

A few general considerations for workstation evaluation are:

The work area should be large enough to accommodate you, allow the full range of motions involved in performing required tasks, and provide room for the equipment and materials.

The items you most frequently use should be easily accessible. These should be generally accessible without stretching bending or turning.

Avoid overcrowding computer work areas.

The area underneath the desk should always be clean/uncluttered to accommodate the user's legs and allow for stretching.

A foot rest should be used if, after adjusting the height of the chair, feet do not rest flat on the floor. ❖

Why are computer professionals more vulnerable to back pain?

The majority of repetitive strain injuries are related to working at the computer (though other repetitive work tasks, hand-intensive sports and hobbies such as knitting or playing a musical instrument, can cause or aggravate a repetitive strain injury). That is because while working at a computer, part of your body is static while other parts move incessantly. Both static postures and constant activity can cause initially microscopic and then macroscopic damage to tissues. If allowed to progress, a repetitive strain injury can develop into a permanent disability.

The following factors singularly or in combination can lead to repetitive strain injury:

Repetition: The repetition of small, rapid movements, such as keying in or using the mouse, for a long time.

Static posture: Holding the same position, especially an uncomfortable or awkward posture, for a long time.

Improper workstation set-up: A workstation (table, chair) that cannot be adjusted to position you properly and comfortably at your computer or other work activity.

Force: Using excessive force to complete tasks.

Insufficient rest time: Intensive hours of working with too few rest breaks to allow your body to recover from an activity.

Sitting pretty

Though experts differ on the composition of a perfect ergonomic chair, there is enough concurrence in acknowledging the fact that chairs need to be ergonomically designed for seating, specially for people who have predominantly desk jobs. Most experts agree that your chair is perhaps the single most important component of a

The following recommendations can help mak

- 'Dynamic sitting', don't stay in one static position for extended periods of time.
- When performing daily tasks, alternate between sitting and standing or take small walking breaks throughout the day.
- The chair back should have a lumbar support
- Adjust height of backrest to support the natural inward curve of the lower back.
- It may be useful to use a rolled towel, lumbar roll or cushion to support the low back.
- The angle of the backrest is subjective but the trunk and upper legs should form an angle between 90 to 115 degrees.
- Adjust height of chair so feet rest flat on the floor. Alternatively use a foot rest
- Sit upright in the chair with the low against the backr the shoulders to the backrest.
- Thighs should be lel to the floor an at about the sam as the hips
- Back of knees sho come in direct with the edge of pan. There shou 4 inches betwe edge of the seat back of the knee

healthy working environment. In fact, it is what most people should adjust first—before modifying their keyboard or monitor position. Find below some essential guidelines on how to position your chair.

You should be able to sit comfortably in the chair, using as much of the chair back as possible for support. The lumbar support should fit comfortably into the curve of your lower back, and your feet should be flat on the ground (use a footrest if necessary). The seat pan (the part on which you sit) should be of an appropriate size that allows at least one inch between your legs and either side of the chair, and supports your legs without applying pressure to the back of your knees.

Contrary to popular belief, sitting, which most

g at the computer more comfortable

Armrests should be removable and the distance between the arm rests should be adjustable.

Adjust height and/or width of armrests so they allow the user to rest arms at their sides and relax/drop their shoulders while using the keyboard

Don't use armrests to slouch. Also, chair arms should not noticeably elevate your shoulders or force you to move your arms away from your body.

- Elbows and lower arms should rest lightly on armrests so as not to cause circulatory or nerve problems
- Use a footrest when attempts to adjust your chair and the rest of the workstation fail to keep your feet on the ground
- Ensure that you have some space (2-3 inches) between the top of your thighs and the underside of your workstation
- Have enough space under your work surface so that you can pull yourself all the way up to the edge of the desk with room for your legs and knees to fit comfortably

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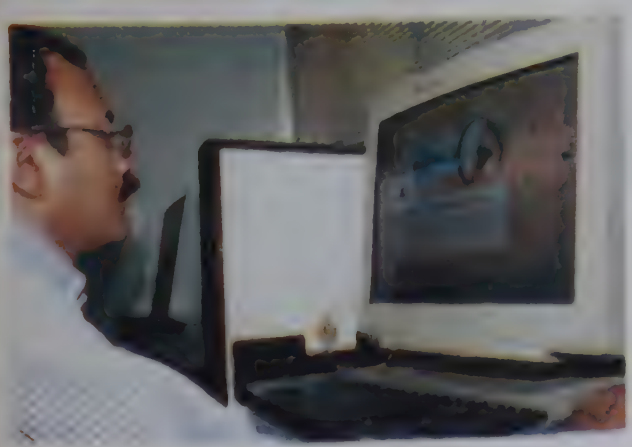
people believe is relaxing, is hard on the back. Sitting for long periods of time can cause increased pressure on the intervertebral discs—the spongy discs between the vertebra. Sitting is also hard on the feet and legs. Gravity tends to pool blood in the legs and feet and create a sluggish return to the heart. ✣

Monitor

Once the chair and work surface height are properly adjusted, the computer monitor should be so placed that the top of the screen is at or just below eye level when you sit upright. The following suggestions can help prevent strain on eyes, neck and shoulder while using your computer workstation:

- Make sure the surface of the viewing screen is clean.
- Adjust brightness and contrast to optimum comfort.
- Position the monitor directly in front of the user to avoid excessive twisting of the neck.
- User must position the monitor at a comfortable viewing distance, approximately 5-8 cm from the user.
- Position monitors at right angles from windows to reduce glare. Close window blinds as needed to reduce glare from sunlight.
- Position monitors away from direct lighting which creates excessive glare or use a glare filter over the monitor to reduce glare.
- Ensure that ceiling lights do not reflect on your screen.



Position the monitor at a comfortable viewing distance, around 5 cm to 8 cm from the user.

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- The document holder should be placed at approximately the same height as the monitor and at the same distance from the eyes to prevent frequent eye shifts between the monitor screen and reference materials.
- Get your eyes checked regularly.
- People who use bifocals and trifocals have to pay attention to the placement of their monitor. They often unknowingly tilt their heads backwards so they can read the screen through the lower portion of their glasses. This can sometimes cause discomfort to the neck, shoulder and back. Potential solutions include either lowering the computer monitor or purchasing glasses designed specifically for working at the computer. ❖

Keyboard

Many ergonomic problems associated with computer workstations occur in the shoulder, elbow, forearm, wrist, and hand. Continuous work at the computer may expose soft tissues in these areas to repetitive, awkward postures, and forceful exertions, especially if the workstation is not set up properly.

The following adjustments should be made to your workstation to help prevent the development of an ergonomic problem in the upper extremities:

- First adjust your chair as mentioned above, then with your arms resting comfortably at your side, raise your forearms to form a 90 degrees angle with your upper arms.
- Adjust keyboard height so that shoulders can relax and allow arms to rest at sides.
- Position the keyboard directly in front and close to the user to avoid reaching out excessively.
- Forearms parallel to the floor (approximately 90

Place the keyboard at such a height that you don't have to strain your arms to type in.

degree angle at elbow).

- Mouse should be placed adjacent to keyboard and at the same height as the keyboard. Avoid extended and elevated reaching for keyboard and mouse. The back of the wrist should be kept flat (in a neutral position). Do not rest the hand on the mouse when you are not using it. Rest hands in your lap when not entering data.
- A padded wrist rest will help to keep your wrist in a straight and neutral position while typing and keep your arms off the sharp edges of the work surface.
- Do not rest your wrists or hands on a palm or wrist rest when you are keying. These rests are designed to provide support only during breaks from keying.
- The slope of the keyboard may need to be adjusted so that it is flat in order that your wrists are straight, and not bent back while you are typing.
- Press the keys gently; do not bang them or hold them down for long periods. Keep your shoulders, arms, hands, and fingers relaxed.
- If your work surface is too high and not adjustable, adjust your chair to bring your arms to the proper position. If you raise your chair make sure your feet are properly supported. ❖

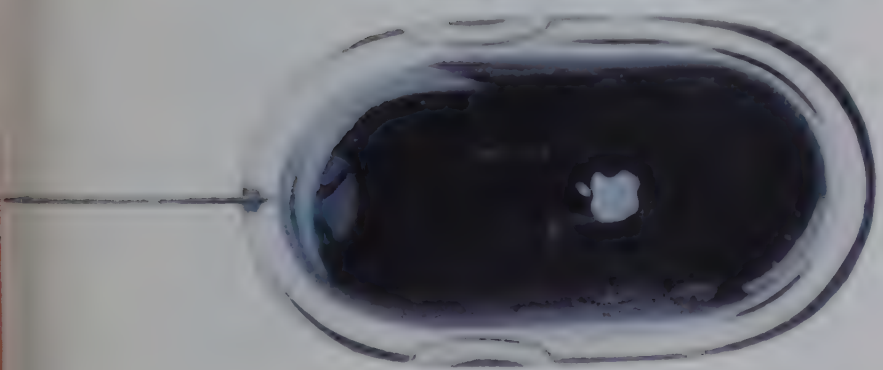
Mouse, trackball, and other devices

The mouse is present in virtually every office environment. Mouses are designed specifically to suit the contours of either the right or left hand.

Placing the mouse, too far away, too low, or too much on one side can cause discomfort to the shoulder, wrist, elbow, and forearm. Placing the input device within your immediate reach offers natural comfort and maximum hand-to-eye coordination.

Do not bend your wrist upward. Make sure you are sitting high enough for the workstation to be slightly below elbow height so that your hand rests naturally on the mouse.

Mousing demands a certain level of surface stability; if used on a keyboard tray, the tray should not wobble or tip. ❖



Lighting

Improper lighting is a major source of visual discomfort. It can be strain on the eyes or it can cause burning, itching, and blurred or double vision.

The following recommendations can help reduce strain on the eyes:

- Close drapes/blinds to reduce glare.
- Adjust lighting to avoid glare on screen (light source should come at a 90 degrees angle, with low watt lights rather than high).
- Avoid intense or uneven lighting in your field of vision.
- Place monitor at 90 degree angle to window.
- Reduce overhead lighting (where possible).
- Use indirect or shielded lighting where possible.
- Use a monitor shield to reduce glare from overhead lighting. ❖

Reduce overhead lighting and avoid intense or uneven light in your line of vision.

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Ergonomic problems inherent to laptops

Laptop computers were designed with portability in mind. However, features that made laptops popular also create problems.

For instance, the fact that a laptop keyboard and monitor do not adjust independently of one another forces a user to choose between comfortable hand/wrist or head/neck posture. This puts the laptop user in an awkward or unhealthy posture which may lead to short and/or long-term discomfort or injury.

In addition, transporting a laptop can cause another strain on the user. Ideally a user should not carry more than 15 per cent of his body weight. Add the laptop weight to other items you are carrying around and calculate the percentage of your weight you are hauling!

Place laptop high enough to avoid straining your neck while working.

Illustration/HEALTH DIRECT

Tips for a laptop user

Use external devices. Attach an external keyboard and pointing device to your laptop. Position them at a

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1. Use a good chair with a dynamic chairback
2. Top of the monitor should be 5-8 cm above eye level
3. Avoid glare on screen. Use an optical glass anti-glare filter if needed.
4. Sit at arm's length from monitor.
5. Feet should be flat on the floor or use a footrest.
6. Document holder and monitor should be at the same level.
7. Keep your wrists flat and straight while using keyboard and mouse.
8. Arms and elbows should be relaxed and close to the body.
9. Monitor and keyboard should be placed right in front.
10. Use a negative tilt keyboard tray with an upper mouse platform or a platform tiltable downward adjacent to the keyboard.
11. Ensure that the work surface and keyboard tray are stable.
12. Take short breaks frequently.

height that allows your upper arms to hang loosely from the shoulder and your forearms to extend horizontally to the floor towards the keyboard.

Raise the laptop. Place the laptop on a stand, book or other surface that raises it to such a height that you can see the screen without having to bend or rotate your neck.

Ensure proper seating. Use a chair that supports your body.

How to carry a laptop

- Carry only the essential laptop accessories.
- Use a sturdy bag, backpack, or rolling luggage.
- Look for laptop-friendly work surfaces. Avoid high table surfaces. Use a keyboard tray if available. If you cannot find a surface that is low enough, choose an armless chair and put the laptop in your lap, using a book or pillow to elevate it a few inches.
- Pack an external mouse. If the integrated touch pad or roller ball causes strain, always bring an external pointing device or use keyboard shortcuts.
- Be aware of your posture. Avoid resting your wrists while typing. Keep your wrists as flat as possible. Use whole hand and arm movements to navigate the keyboard. Avoid bending your neck and head forward to look at the screen. Take frequent breaks. ❖

Ergonomics of driving a car

Most of us who drive a car must have felt back pain at some point of time. A comfortable driving position goes a long way in delaying the onset of back pain.

The principles of ergonomics are as relevant to driving as to your office. A few key ergonomical aspects of your car are listed below. It is important to remember that the greater the number of adjustable features in a car, the greater the likelihood of achieving a good and comfortable posture.

Look for certain features in a car, for instance,

- A comfortable and supportive seat with an independent height and tilt adjustment
- Seat material that does not cause discomfort and make sure that all parts of the seat provide adequate support.

- Adequate leg length to ensure thighs are adequately supported
- The seat base should not be too short or too long.
- Adequate base width to ensure that seat base is wider than hips and thighs.
- Adequate height adjustment of seat base to ensure that you don't have to stretch your feet to operate pedals.
- Optimal positioning to ensure that all controls are easily reachable, all display instruments can be seen and you get a good all-round vision.
- Back rest height should reach the shoulders and should not obstruct rear vision.
- Backrest width should be wide enough to support shoulders.
- Backrest should provide continuous support along the length of the back and an adjustable lumbar support may help achieve this.
- Always ensure the lumbar support fits your shape and is comfortable.
- Ensure the seat belt is adjustable and comfortable.
- An adjustable steering wheel (in/out, up/down and tilt)
- Power steering: Ensure steering wheel is centrally positioned to prevent rotation of the spine.
- If a hands-free mobile phone kit is to be fitted, ensure the cradle, microphone and speaker are appropriately positioned to encourage good posture. ❖

A comfortable posture while driving a car goes a long way in delaying the onset of backache.

The job you love so much can sometimes be a pain in the neck. Since repetitive activities at workplace can injure your muscles, tendons and nerves, ergonomists have tried to define postures that minimise wear and tear. The following principles could reduce your risk of injury:

Change postures as often as possible. The different postures should be healthy, though.

If your work requires you to exert muscular force, use the largest appropriate muscle groups.

Use your joints at the mid-point of their range of movement.

However, to put these principles into practice, you need to be more sensitive to your movements. You also need to observe your body in a new light. Below are some simple exercises you can do at your workplace to keep yourself fit.

- Tilt your head to one side and place your palm on top of head to hold in the same position for 10 seconds. Come back slowly and repeat this on the other side.
- Take a deep breath and raise both arms over head. Hold, exhale and lower slowly.
- Place arms behind your head. Relax, and while you keep your shoulders back, squeeze shoulder blades together.
- Sitting in your chair, wrap your feet around the chair legs. Now reach across the back of the chair, grab and pull gently. This is good for your back.
- Pull your shoulder blades back and down while you grasp your hands together behind.

Conclusion

Designing an ergonomically correct work place is not much of a bother. The real issue lies in changing the mind set. Of acknowledgement and acceptance of poor ergonomics as a potential health hazard.

Though there is an increased awareness about ergonomics, the fact remains that people need to become more aware. As more and more professionals join the sunrise sectors where demands of productivity is very high, ignorance of ergonomics could prove costly in the long run. ❖

THE WEEK SUPPLEMENT

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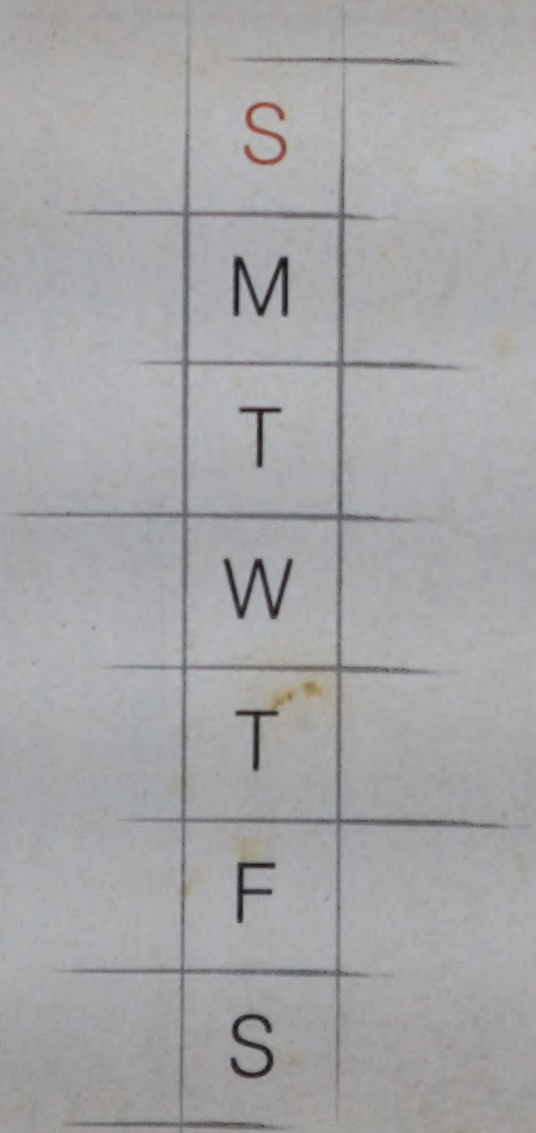

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